

Trend Study 16A-14-02

Study site name: Big Hollow.

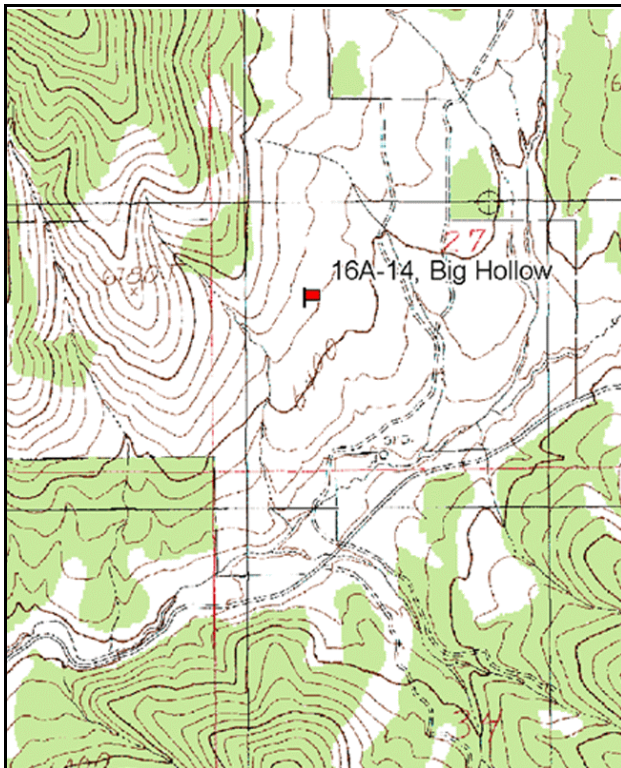
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: no rebar placed on site.

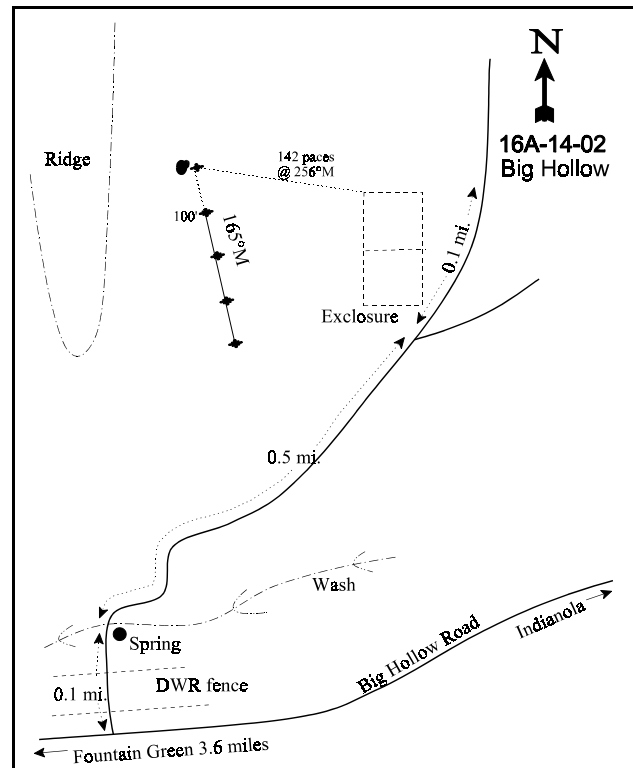
LOCATION DESCRIPTION

At the intersection of State Street and 100 North in Fountain Green, go east on 100 North for 0.3 miles to the old dump. Continue up Big Hollow for 3.3 miles to a gate parallel to the road onto DWR land. Turn left through the gates and go 0.1 miles to a spring in a wash. Continue on this road for 0.5 miles to a fork. Stay left and go 0.1 miles to the north end of an enclosure. Park here. From the northwest corner of the enclosure, walk 142 paces at a bearing of 256 degrees M to a tall fencepost in the sagebrush. This 4-foot tall green fencepost is the 0-foot baseline stake.



Map Name: Big Hollow

Township 13S, Range 3E, Section 27



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4389659 N 450200 E

DISCUSSION

Big Hollow - Trend Study No. 16A-14

The Big Hollow study is located on Division property east of Fountain Green on a large area that was chained in 1964. However, there is little evidence of the treatment on the site which is located near the bottom of a ridge. Trees appear to have never been very dense on the site, and no seeded species are present. Other areas of the chaining were apparently more heavily seeded. Point-quarter data from 2002 estimated only 24 scattered junipers trees/acre on the site, averaging 6-10 feet in height. Average diameter was about 6 inches. The dominant vegetation is basin big sagebrush with a smaller element of bitterbrush. There is a perennial spring 200 yards southeast of the study. Due to the availability of water during the dry year of 1989, deer were using the area during the summer. However, the majority of big game use occurs in winter and spring. One recent winter-killed fawn was found on the site in 1989. In 1997, rabbit pellet groups were relatively abundant with a quadrat frequency of 26%. A pellet group transect of 50, 100ft² circular plots was read in 1997 and estimated 31 deer days use/acre, 2 elk days use/acre, and 6 cattle days use/acre (77 ddu/ha, 5 edu/ha, and 15 cdu/ha). Pellet group transect data from 2002 estimated 62 deer, 1 elk, and 8 cow days use/acre (153 ddu/ha, 3 edu/ha, and 20 cdu/ha). Most of the deer pellet groups were from winter use. Rabbit pellets are very abundant and have increased in quadrat frequency from 26% in 1997 to 73% in 2002.

The soil is a moderately deep, sandy clay loam with an effective rooting depth of almost 12 inches. It contains a substantial amount of small rocks that are concentrated as erosion pavement on the soil surface. Rock and pavement cover together had a cover value of 30% in 1989, 23% in 1997, and 20% in 2002. Rock is concentrated in the upper 8 inches of the soil profile. As a result, soil temperature was relatively high, averaging 63°F at an average depth of 13 inches. Litter cover is moderately low due to the sparse herbaceous understory. Percent bare ground was 17% in 1989, increasing to 21% by 2002. Considering the amount of rock, pavement, and exposed soil, there is little erosion because of the level topography. In addition, the soil erosion condition classification was determined as stable in 2002.

As winter range, browse is the key forage component. Basin big sagebrush (*Artemisia tridentata tridentata*) made up 63% of the browse cover in 1997, increasing to 82% in 2002. It is characteristically tall and vigorous with mostly light utilization. Population density was originally estimated at 2,599 plants/acre in 1989. Recruitment was adequate, vigor good, but percent decadency was moderately high at 33%. Data from 1997 show a 32% decline in density to 1,780 plants/acre. The number of mature plants remained similar with the density of young and decadent plants decreasing. Some of the difference between years may be due to the larger sample used in 1997, but 42% of the difference can be explained by the number of dead plants on the site (340 plants/acre). Density and cover of sagebrush remained similar in 2002 at 1,880 plants/acre and a cover value of 15%. Reproduction remains adequate, vigor normal on most plants, with decadence still moderately high at 35%.

Bitterbrush numbered only 599 plants/acre in 1989. Vigor was good on the moderate to heavily hedged plants. They had relatively open crowns, average growth, and seed production. The taller shrubs exhibited good leader growth when the branches are out of reach from browsing. During the 1997 reading, density of bitterbrush was estimated at only 280 plants/acre. Since no dead plants were encountered, this density is considered a more accurate population estimate due to the larger sample size used in 1997. Bitterbrush in 1997 were classified as moderately to heavily hedged. Percent decadency was relatively low at 21%, but all decadent plants sampled displayed poor vigor and appeared to be dying. Young plants account for 29% of the population and were abundant enough to replace the decadent, dying individuals. Bitterbrush density was estimated at 320 plants/acre in 2002. Mature plants have continued to grow taller and now average nearly 6 feet in height. Some plants are becoming partly unavailable to browsing. Due to drought conditions for the past few years, the bitterbrush population has become increasingly decadent, increasing from 21% in 1997 to 63% in 2002. Use was also extremely heavy in 2002. Annual leader growth was poor averaging only ½ inch in 2002. Recruitment was nonexistent with no seedlings or young sampled in 2002.

Broom snakeweed, an undesirable invader/increaser, increased dramatically between 1989 and 1997. It increased from only 799 plants/acre to 22,560 plants/acre. Strip frequency indicated that it was widely distributed throughout the site with a frequency of 79%. The age distribution of the population indicated an expanding population. Due to drought conditions, broom snakeweed declined to only 160 plants/acre in 2002.

The herbaceous understory is diverse but not particularly productive. Annual cheatgrass was the most abundant grass in 1997 and 2002, providing 42% and 34% of the total grass cover respectively. Common perennial grasses include bluebunch wheatgrass, Carex, squirreltail, and needle-and-thread. No seeded grasses were encountered on the study site, although the nearby exclosure supports a much higher abundance of seeded grasses. The forb composition is composed mostly of small annual species. Perennial forbs are rare.

1989 APPARENT TREND ASSESSMENT

The Big Hollow area provides quality big game winter range with an abundance of browse forage. The site sampled is less productive in terms of herbaceous vegetation for spring use, but other parts of the treated area have robust stands of seeded grasses. Trends for deer winter range values appear stable.

1997 TREND ASSESSMENT

Trend for soil is up slightly due to a decline in percent bare soil and an increase in nested frequency of perennial grasses. Browse trend for the preferred species, basin big sagebrush and bitterbrush appear stable. However, the large increase in broom snakeweed from 799 plants/acre to 22,560 plants/acre indicates a deteriorating trend. The herbaceous understory is sparse, but sum of nested frequency of perennial grasses and forbs increased slightly. The nearby exclosure supports a good stand of seeded and native grasses, illustrating the obviously heavy livestock use of the herbaceous vegetation outside of the fence.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable for sagebrush (3)

herbaceous understory - up slightly (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Bare soil increased and litter cover slightly decreased. However, herbaceous cover increased as did sum of nested frequency of perennial grasses. There is still adequate protective ground cover to prevent most erosion and the erosion condition classification was determined as stable in 2002. Trend for the key browse species, basin big sagebrush, is stable. Density has remained similar to 1997 estimates but the number of decadent plants has increased. Use continues to be mostly light. The very abundant broom snakeweed sampled in 1997 has declined dramatically due to drought conditions. Density fell from 22,560 plants/acre in 1997 to only 160 plants/acre in 2002. Bitterbrush is also showing the effects of drought. Density has remained stable but use is very heavy and the number of decadent plants has risen from 21% of the population to 63%. Recruitment is currently poor but should rebound with a return to normal precipitation. Annual leader growth of bitterbrush was also poor averaging only ½ of an inch. Shrubs within the nearby exclosure visually display the same trends. The herbaceous trend is stable. Sum of nested frequency of perennial grasses has increased slightly while frequency of perennial forbs has declined slightly. Annual cheatgrass still provides the most grass cover (34%), but frequency and cover of bluebunch wheatgrass, Carex, and squirreltail all increased. Seeded perennial grasses were more abundant in both the total and livestock exclosures. Forbs are still rare and provide little forage.

TREND ASSESSMENT

soil - stable (3)

browse - stable for sagebrush (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 16A, Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
G	Agropyron dasystachyum	-	-	5	-	-	3	-	.04
G	Agropyron spicatum	_a 11	_b 39	_b 38	5	18	17	.70	2.45
G	Bromus japonicus (a)	-	_a -	_b 21	-	-	9	-	.09
G	Bromus tectorum (a)	-	238	242	-	84	80	3.74	4.85
G	Carex spp.	_a -	_b 41	_c 61	-	16	19	.74	2.33
G	Oryzopsis hymenoides	74	67	45	29	29	19	1.85	1.14
G	Poa secunda	-	3	-	-	1	-	.00	-
G	Sitanion hystrix	_b 89	_a 40	_b 79	41	18	33	.86	2.18
G	Stipa comata	_a 12	_b 46	_b 54	6	19	26	1.05	1.00
Total for Annual Grasses		0	238	263	0	84	89	3.74	4.95
Total for Perennial Grasses		186	236	282	81	101	117	5.21	9.17
Total for Grasses		186	474	545	81	185	206	8.96	14.12
F	Alyssum alyssoides (a)	-	_a 148	_b 241	-	58	78	1.02	2.07
F	Astragalus spp.	1	-	3	1	-	1	-	.00
F	Calochortus nuttallii	-	2	5	-	2	3	.01	.01
F	Chaenactis douglasii	_a 12	_b 21	_a 5	5	11	4	.11	.02
F	Chenopodium spp. (a)	-	2	-	-	1	-	.00	-
F	Cirsium spp.	8	17	17	4	8	8	.04	.31
F	Collinsia parviflora (a)	-	-	4	-	-	1	-	.00
F	Descurainia pinnata (a)	-	-	1	-	-	1	-	.00
F	Eriogonum cernuum (a)	-	-	3	-	-	1	-	.00
F	Erodium cicutarium (a)	-	-	4	-	-	1	-	.00
F	Eriogonum spp.	1	2	-	1	1	-	.00	-
F	Gilia spp. (a)	-	1	-	-	1	-	.00	-
F	Hackelia patens	-	4	-	-	1	-	.03	-
F	Lactuca serriola	-	1	-	-	1	-	.00	-
F	Microsteris gracilis (a)	-	_a -	_b 11	-	-	6	-	.03
F	Orobancha fasciculata	-	1	-	-	1	-	.00	-
F	Penstemon spp.	-	-	1	-	-	1	-	.00
F	Polygonum douglasii (a)	-	15	2	-	6	2	.05	.01
F	Ranunculus testiculatus (a)	-	_a -	_b 30	-	-	11	-	.08
F	Sphaeralcea coccinea	42	35	43	14	18	17	.47	.64
F	Tragopogon dubius	8	3	1	4	1	1	.01	.00
Total for Annual Forbs		0	166	296	0	66	101	1.09	2.21
Total for Perennial Forbs		72	86	75	29	44	35	0.69	1.01
Total for Forbs		72	252	371	29	110	136	1.78	3.22

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Herd unit 16A, Study no: 14

Type	Species	Strip Frequency		Average Cover %	
		'97	'02	'97	'02
B	Artemisia tridentata tridentata	61	57	14.77	14.69
B	Artemisia tridentata vaseyana	1	1	.30	.78
B	Gutierrezia sarothrae	79	8	5.73	.01
B	Juniperus osteosperma	0	1	-	.00
B	Opuntia spp.	5	2	.18	-
B	Purshia tridentata	12	13	2.27	2.38
Total for Browse		158	82	23.27	17.87

Key Browse Annual Leader Growth

Herd unit 16A , Study no: 14

Species	Average leader growth (in) '02
Artemisia tridentata tridentata	1.7
Purshia tridentata	0.5

Point-Quarter Tree Data

Herd unit 16A , Study no: 14

Species	Trees per Acre '02	Average diameter (in) '02
Juniperus osteosperma	24	6.0

BASIC COVER --

Herd unit 16A, Study no: 14

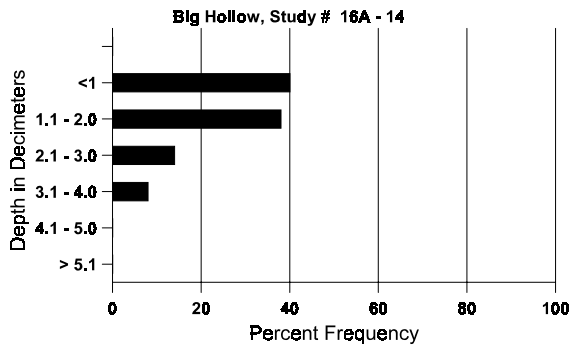
Cover Type	Nested Frequency		Average Cover %		
	'97	'02	'89	'97	'02
Vegetation	333	334	3.25	33.79	35.76
Rock	180	188	3.75	5.09	4.71
Pavement	292	271	26.25	17.61	15.09
Litter	384	371	49.00	44.18	38.18
Cryptogams	74	102	.50	1.59	5.34
Bare Ground	246	273	17.25	11.16	20.92

SOIL ANALYSIS DATA --

Herd Unit 16A, Study no: 14, Big Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.7	63.4 (13.2)	6.8	48.0	27.1	24.9	2.9	13.3	166.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 16A, Study no: 14

Type	Quadrat Frequency		Pellet Transect			
			Pellet Groups per Acre		Days Use per Acre (ha)	
	'97	'02	'97	'02	'97	'02
Rabbit	26	73	-	-	-	-
Elk	2	1	26	9	2 (3)	1 (2)
Deer	32	14	409	809	31 (78)	62 (154)
Cattle	1	3	70	96	6 (14)	8 (20)

BROWSE CHARACTERISTICS --

Herd unit 16A, Study no: 14

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total											
		1	2	3	4				5	6	7	8	9	1	2	3	4		
Artemisia tridentata tridentata																			
S	89	2	-	-	1	-	-	-	-	-	3	-	-	-	200				3
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80				4
	02	9	-	-	-	-	-	-	-	-	9	-	-	-	180				9
Y	89	4	-	-	1	-	-	-	-	-	5	-	-	-	333				5
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180				9
	02	6	-	-	1	-	-	-	-	-	7	-	-	-	140				7
M	89	15	6	-	-	-	-	-	-	-	19	2	-	-	1400	31	33	21	
	97	54	1	-	1	-	-	-	-	-	56	-	-	-	1120	29	41	56	
	02	40	9	4	-	-	1	-	-	-	54	-	-	-	1080	44	51	54	
D	89	11	1	-	1	-	-	-	-	-	12	-	-	1	866				13
	97	21	2	-	1	-	-	-	-	-	16	-	-	8	480				24
	02	21	8	-	3	-	-	-	-	1	15	-	3	15	660				33
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0				0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	340				17
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	560				28
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>					
'89		18%				00%				03%				-32%					
'97		03%				00%				09%				+ 5%					
'02		18%				06%				19%									
Total Plants/Acre (excluding Dead & Seedlings)												'89	2599	Dec:	33%				
												'97	1780		27%				
												'02	1880		35%				

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	-	1	-	-	20	-	-	1
	02	1	-	-	-	-	-	-	-	-	-	1	-	-	20	25	31	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%			+ 0%							
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	20		-			
												'02	20		-			
Cowanania mexicana stansburiana																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	65	94	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	0		-			
												'02	0		-			
Gutierrezia sarothrae																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
	02	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
Y	89	1	-	-	-	-	-	-	-	-	-	1	-	-	66			1
	97	327	5	-	2	-	-	-	-	-	-	334	-	-	6680			334
	02	8	-	-	-	-	-	-	-	-	-	8	-	-	160			8
M	89	11	-	-	-	-	-	-	-	-	-	11	-	-	733	6	4	11
	97	758	-	-	35	-	-	-	-	-	-	793	-	-	15860	9	13	793
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			+96%							
'97		.44%			00%			.08%			-99%							
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	799	Dec:	0%			
												'97	22560		0%			
												'02	160		0%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	1	-	-	-	-	-	-	-	-	1	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%										
'02		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	0		-			
												'02	20		-			
Opuntia spp.																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	-	-	7
	02	-	2	-	-	-	-	-	-	-	2	-	-	-	40	5	10	2
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%			-63%							
'02		67%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	0%			
												'97	160		0%			
												'02	60		33%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	89	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	1	-	1	2	-	-	-	-	-	4	-	-	-	80		4	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	89	-	4	-	-	-	-	-	-	-	4	-	-	-	266	24 38	4	
	97	-	4	1	1	1	-	-	-	-	7	-	-	-	140	46 76	7	
	02	-	1	-	-	-	5	-	-	-	6	-	-	-	120	68 59	6	
D	89	1	1	1	-	-	-	-	-	-	3	-	-	-	200		3	
	97	1	-	1	-	-	1	-	-	-	-	-	-	3	60		3	
	02	-	-	3	-	-	6	-	-	1	6	-	-	4	200		10	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'89			67%			11%			00%							
		'97			36%			29%			21%							
		'02			06%			94%			25%							
Total Plants/Acre (excluding Dead & Seedlings)												'89	599	Dec:	33%			
												'97	280		21%			
												'02	320		63%			